ENCAPSULATION METHOD OF A POLYMER OR ORGANIC LIGHT EMITTING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an encapsulation method of a polymer or organic light emitting device and, more particularly, to an encapsulation method of a polymer or organic light emitting device using multiple polymer layers.

2. Description of the Prior Art

Generally, in a conventional encapsulation method of packaging a light emitting device and display device, it is well known to perform such packaging by using of an inorganic matter, there is not used an encapsulation method by use of an organic or polymer.

SUMMARY OF THE INVENTION

It is an object of the present invention to increase the lifetime of a device by it from oxygen and moisture in the air which penetrate into a device and cause the organic or polymer light emitting device to be degraded.

In order to accomplish the above object, the present invention provides an encapsulation method of a polymer or organic light emitting device, wherein the method comprises steps of:

forming an organic or polymer light emitting device on a transparent substrate; wrapping the device with multiple polymer multiple films to protect the organic or polymer light emitting device from oxygen and moisture.

In one aspect of the present invention, the lifetime of the device is to be extended without having an effect on any mechanical physical property of a flexible light emitting device due to the encapsulation of the light emitting device using multiple polymer multiple films having a permeability of an oxygen and reduced moisture.

It is known that the lifetime of an organic or polymer light emitting device is greatly influenced by oxygen and moisture in the air. Accordingly, there has been studied the characteristics of such a device in an inert atmosphere such as a vacuum. To realize the light emitting device, it is necessary that the device should be protected from oxygen or moisture in the air. However, it is not easy to shield the device from oxygen or moisture in the air, and therefore it has not been studied well. The present invention intends to prevent the penetration of oxygen or moisture into an organic or polymer light emitting device by an encapsulation of the light emitting device around the device utilizing multiple polymer thin films having low transmitability of oxygen or moisture.

In another aspect of the present invention, the present invention provides an encapsulation method of a polymer or organic light emitting device on a flexible transparent plastic substrate as multiple polymer films shield the device from oxygen and moisture.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and features of the present invention will become apparent from the following description of preferred embodiments, when taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a sectional view of an encapsulation of an organic or polymer light emitting device with multiple polymer films.

FIG. **2** is a top view of an encapsulation of an organic or polymer light emitting device with multiple polymer films.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, the embodiment of the present invention will be explained in detail with reference to the drawings attached.

FIG. **1** is a sectional view showing an encapsulated structure of an organic or polymer light emitting device with multiple polymer films, FIG. **2** is a schematic perspective view of FIG. **1**.

FIGS. **1** and **2** illustrate a transparent plastic substrate **1**, a transparent electrode **2**, a charge transport layer **3**, an organic or polymer light emitting light layer **4**, a charge transport layer **5**, a metallic electrode for a cathode **6**, a simultaneous oxygen and moisture protection protecting layer **7**, an oxygen protecting layer **8**, and a moisture protecting layer **9** respectively.

As shown in FIG. **1**, the present invention comprises a simultaneous oxygen and moisture shielding layer **7**, an oxygen shielding layer **8**, and a moisture shielding layer **9**, to wrap an upper overall surface of a light emitting device which is integrated sequentially as follows: a transparent plastic substrate **1**, a transparent electrode **2** having a constant patterned width on the substrate **1**, a charge transport layer **3**, an organic or polymer light emitting layer **4**, a charge transport layer **5**, a metallic electrode for a cathode **6**, and oxygen and moisture protecting layers **8**, **9** being formed on a back overall surface of the substrate.

Hereinafter, there will be explained an encapsulation method of the present invention having the construction as set forth above.

First, there is formed a transparent electrode **2** on the transparent plastic substrate **1**. Conventionally, there is widely used a polyethylene terephthalate (PET) as the transparent plastic substrate. However, in the present invention, there is used a plastic thin layer of transparent polyethyl naphthalate (PEN) derivatives having oxygen and moisture permeability which is very low, or a rubber film of transparent and flexible polyurethane derivatives also having low oxygen and moisture permeability.

There is conventionally formed inorganic indium tin oxide use as a transparent electrode **2** by means of a low temperature deposition. In the present invention, there is used a polymer of conductive polyaniline, polythiophene derivatives as the polymeric materials by means of a spin coating. The transparent electrode can be formed by various kinds of patterns by means of a well-known pattern process as required.

Subsequently, there is formed a charge transport layer (hole transport layer) **3** of a polymer or organic materials on the transparent electrode **2** as required through a spin coating or a vacuum deposition. The thickness of this transport layer is 10–50 nm. The charge transport layer **3** functions to help the hole injection into a light emitting layer **4** from the transparent electrode **2** as a method to increase the luminous efficiency of the light emitting device.

Next, the polymer or organic light emitting layer **4** is formed on the charge transport layer **3** by a method of spin coating or vacuum deposition. The thickness of the light emitting layer **4** is 50–100 nm, and there can be used a polymer blend of which various emissive materials are compounded to emit various colors. The polymer or organic materials forming the light emitting layer has structural